

# Consul, a new profile in computer terminals





```

100 LET A = 5
110 LET B = 6, C = 7
120 INPUT A117
130 PRINT "YOUR DISCOUNT IS" " " " " "READY? "
140 INPUT A#
150 IF A# = "YES" GOTO 170
160 IF A# = "NO" GOTO 130
170 PRINT
180 PRINT
190 PRINT "$." (2500 *A +62( B + C ) )
200 GOSUB 2000
210 REM *****
220 REM BEGINNING OF THE SECOND SUBROUTINE
230 REM *****
2000 INPUT R$,S$,T$,L,M,N
2010 PRINT

```





# Aspects of design: I

We designed the Consul series of CRT terminals to appeal to a broad cross section of the time sharing market.

One way to use a Consul is as a direct replacement for Teletypes.\* With no changes in software.

But this stand-alone terminal is capable of much more. It has features that allow a user to take full advantage of the inherent flexibility of a buffered CRT terminal. And thus increase the capability of his entire system.

**Teletype compatibility.** The three models—Consul 800, 840 and 880—are all Teletype-compatible. The 800 displays 16 lines of 32 characters; the 840, 16 lines of 64 characters; the 880, 20 lines of 80 characters. All three are available with an optional built-in modem.

**Easy to read.** Unlike most computer terminals, the Consul uses a commercial TV monitor. This allows us to utilize standard raster techniques which make for sharp, legible characters. Also, we display black characters on a white display page centered on the screen. This makes it easy to anticipate the last character on a line and the last line on a screen. All of these features sharply reduce eyestrain.

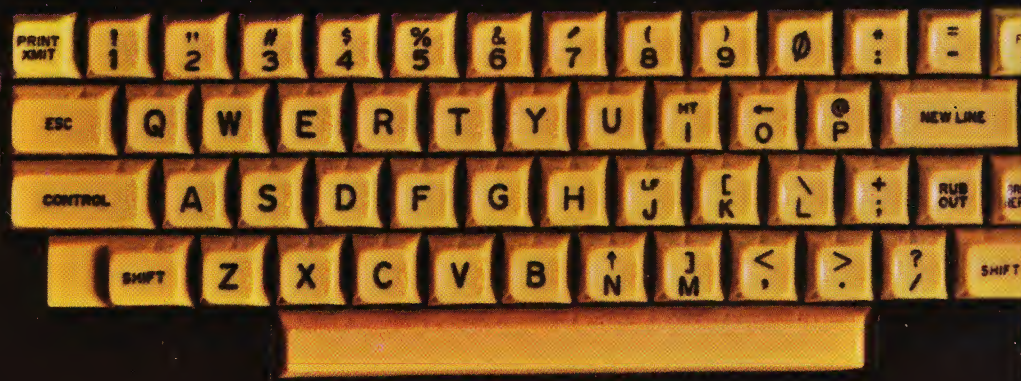
**Additional features.** The outer shell lifts easily for maintenance. A plexiglas front panel reduces glare. All three models are made with the same solid state keyboard, the same TV monitor and the same proven electronics.

\*Registered trademark of Teletype Corporation





170 PRINT  
180 PRINT  
190 PRINT  
200 GOTO 2000  
210 REM \*\*\*\*\*  
220 REM BEGINNING OF THE SECOND SUBROUTINE  
230 REM \*\*\*\*\*  
2400 INPUT R\$;S\$;T\$;L\$;M\$;N  
2510 PRINT





# Aspects of design: II

**The keyboard.** The keys on the left side of the keyboard are patterned after the standard Model 33 teletypewriter, but have the feel of an office typewriter. On the right are the keys for cursor control and editing. There are also keys for blinking and formatting data.

**Operating modes—conversational.** This mode gives the Consul plug-to-plug compatibility with Teletype terminals. Each character typed appears on the screen as it is simultaneously transmitted. A scroll feature rolls lines of data up the screen from bottom to top.

**Edit sub-mode.** Unlike most Teletype-compatible terminals, Consul allows the operator to edit in the conversational mode without retyping the entire line. When the operator moves the cursor to correct a mistake, the terminal automatically goes into an edit sub-mode. Once editing is completed the terminal retransmits the entire line and automatically switches back to the conversational mode. As a visual aid, the edited line appears white on a black background, the reverse of the normal display.

**Operating modes—page.** In this mode the operator can write and edit an entire page of data before transmission. Each character typed goes into the terminal memory and appears on the screen. To transmit, the operator strikes the transmit key, causing the entire page of data to be transmitted to the computer.

**Operating modes—message.** In this mode the operator can write and edit a partial page of data. The operator positions the cursor at the beginning of the message, and the terminal will transmit only that data between the cursor position and the bottom of the screen.

**Editing controls.** To edit, the operator uses the cursor (up, down, forward, backward and home), horizontal tab and screen erase controls. An insert/delete feature enables the operator to insert or delete a character at any position on the screen.

**Look-ahead feature.** In the page and message modes, a look-ahead feature saves on transmission time. It scans ahead and if the rest of a line is blank, the cursor goes directly to the next line rather than transmit blanks. If the rest of the screen is blank, the cursor returns to the home position.





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PERSONAL      HOME LIFE      PHYSICAL  
SINGLE      OWN HOME: YES      HEIGHT: 5 FT. 1 IN.  
MARRIED: YES      RENT:      WEIGHT: 185 LBS.  
EMPLOYED:      LINE R. STATUS:      COLOR HAIR: BROWN  
MARRIED:      COLOR EYES: GREEN  
DEPENDENTS: 4      CITIZENSHIP: USA      PHONE: 543-8941  
DRAFT STATUS: 1Y      DATE OF BIRTH: 1/24/42  
EDUCATION: WELLINGTON HIGH SCHOOL 1961  
CITY COLLEGE OF NEW YORK 1965 (BSEE)  
PRINCETON UNIVERSITY 1968 (MSEE)



# Aspects of design: III

**Formatting.** When the terminal is in the page or message modes, a formatting feature allows for the display of both fixed and variable data. This feature not only makes data entry easier and faster, but assures that all data is entered.

The operator requests a particular form from the computer (or sets one up on the screen herself). She then fills in the appropriate blanks. The terminal transmits only variable data to the computer.

When the format feature is on, tabbing enables the operator to skip from one variable data field to the next. Fixed data appears on the screen as gray characters (half intensity); variable data appears in black.

During transmission, the look-ahead feature scans ahead to the end of a variable data field. If the rest of the field is blank, the cursor goes directly to the next variable data field.

Fixed data cannot be erased or altered accidentally because the cursor and erase controls operate only on data fields reserved for variable data.

**Communications interface.** The Consul has a standard EIA RS-232-B communications interface so a customer can use his own modem. The terminal receives and transmits in half duplex at 110 or 300 baud, switch selectable. It is also available with a parallel interface for direct connection to a computer.

**Optional modem.** A built-in modem, which is optional, can operate either acoustically or with hardwire. The acoustic coupler uses the handset of an ordinary telephone. Hardwire connection can be made directly to a Data Access Arrangement.





## Specifications

**Consul-800**—16 lines of 32 characters each, not available with character insert/delete or formatting features.

**Consul-840**—16 lines of 64 characters each, character insert/delete and formatting features standard.

**Consul-880**—20 lines of 80 characters each, character insert/delete and formatting features standard.

**Modes**—conversational (including edit sub-mode), page and message.

**Character set**—64 alphanumeric characters, each formed by 5x7 dot matrix.

**Display presentation**—the data appears as dark characters on a light background.

**Screen size**—9" diagonal.

**Refresh rate**—60 frames per second.

**Type of memory**—solid state, MOS semiconductor.

**Controls**—horizontal tab; screen erase; new line; cursor: up, down, back, forward, home; insert/delete (Consul 840 & 880); format on/off (Consul 840 & 880).

**Panel indicators**—power, carrier.

**Keyboard**—solid state. All TTY alphanumerics and control codes can be generated.

**Communications interface**—conforms to EIA RS-232-B specification.

**Transmission**—half-duplex at 110 or 300 baud (switch selectable).

**Modem (optional)**—built-in modem operates in two ways: either acoustically coupled, or via hardwire connection to a DAA. Compatible with Bell System 103 datasets.

**Power**—115  $\pm$  10% VAC/60 Hertz, 110 VA nominal.

**Size**—16¾" x 20" x 14"

**Weight**—50 lbs. (approx.)



# ADDs

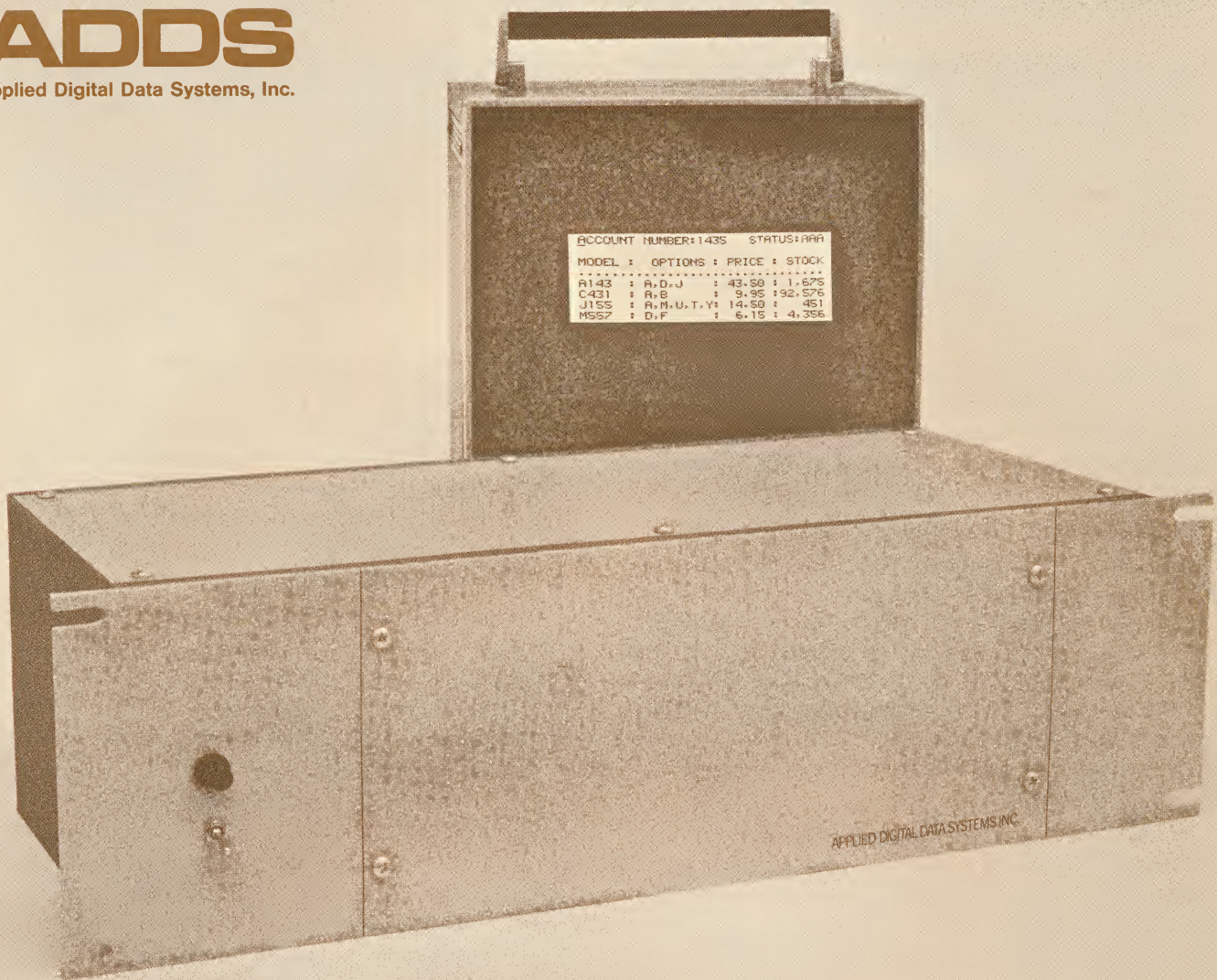
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# ADDS

Applied Digital Data Systems, Inc.



## MRD-200 Memory Raster Display

### Features

**Low-cost readout.** The MRD-200 makes it practical to use TV monitors for reading out alphanumeric data from computers, keyboards, magnetic tapes or any other serial data source.

**Direct data display from its own memory.** The MRD-200 accepts ASCII-coded alphanumeric serial data, stores it in its own refresh memory and displays it on one or more standard TV monitors.

**Compatible video signal.** The composite video signal is compatible with any commercially available 525-line television monitor.

**Flexible data arrangement.** Data can be displayed in 1, 2, 4, 8 or 16 lines with either 32 or 64 characters per line.

**Read and write capability.** The memory of the MRD-200 can be read from, as well as written into, using simple control commands.

**Complete cursor controls.** The cursor can be moved up, down, forward, back and home.

**Line addressing.** Each line of data displayed on the screen can be individually addressed.

**Convenient editing controls.** All or part of the screen can be erased. Any character or characters can be made to blink.

**Flexible display formatting.** Data in any location can be placed in a "protected" condition for the display of fixed and variable data.

**Outstanding legibility.** Clear, stable characters are easy to read. Automatic refreshing keeps data bright and flicker-free.



## General Description

The MRD-200 offers an alphanumeric readout that accepts serial (bit parallel) ASCII-coded characters, stores them in its own refresh memory and displays them on one or more 525-line television monitors.

Its memory can store 32, 64, 128, 256, 512 or 1,024 characters. Data may be arranged on a display page in 1, 2, 4, 8, or 16 lines, with 32 or 64 characters per line. The data is centered on the screen.

To enter new data, the MRD-200 writes new characters over old. Optional controls are provided for reading from, as well as writing into, memory. Separate buffered output and input lines are utilized for the "read" and "write" functions.

The cursor can be moved in any direction in the display page by using the cursor controls. The MRD-200 can also move the cursor to the beginning of any line by using the "line select" command. Cursor movement is accomplished without altering any of the displayed data. Other controls include a command to erase all or part of the screen, a command to blink any character or characters, and a command to horizontally tab.

An optional protection control is available for displaying fields of fixed and variable data. For this control, the memory locations allocated to fixed data are placed in a "protected" condition. This prevents the fixed data from being altered or read out. It also enables the user to erase only the

variable data and to tab between fields of variable data.

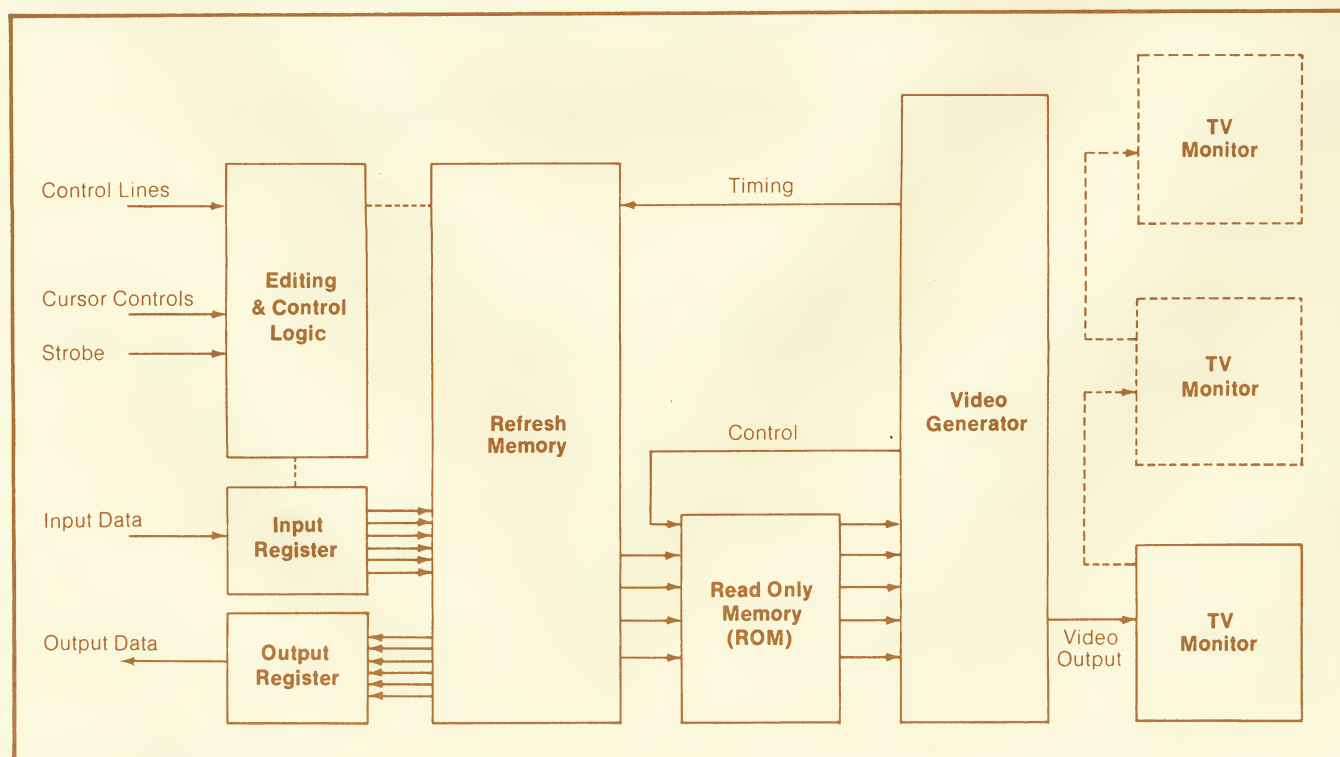
The MRD-200 is comprised of three major elements: editing and control logic, refresh memory, and video generator.

The editing and control section provides the logic for changing the cursor location or executing the control commands. Each command is initiated by a strobe which the user must provide.

An LSI/MOS shift register memory stores all data to be displayed. This memory circulates data in synchronism with the scan rate of the television monitor and refreshes the display 60 times per second. To meet various user requirements for memory capacity and data arrangement, the MRD-200 is available in a Fast (F) or Slow (S) memory organization. The two memory organizations and their execution times are shown in tables 1 and 3.

The video generator provides all timing and synchronizing pulses, and converts the data stored in memory into a composite video signal. An LSI/MOS Read Only Memory (ROM) within the video generator stores the dot pattern for the standard MRD-200 character set. Special Read Only Memories can be supplied to provide customized character sets.

The MRD-200 can be rack-mounted in a standard 19-inch RETMA relay rack, taking up 5¼ inches vertically. It plugs directly into a 117 VAC outlet. No additional power supplies are necessary.



Simplified block diagram MRD-200, Memory Raster Display



## Control Commands

**Write data.** Takes a character from the input data lines, inserts it into the current cursor location\* and advances the cursor to the next location. If the cursor is in the last location of a line, it advances to the beginning of the next line. If it is in the last location of the last line, it moves to the beginning of the first line.

**Select line.** Places the cursor at the beginning of the display line whose line number is defined by data present at the input data lines. Lines are numbered top to bottom, 0, 1, 2, 3, etc. up to a maximum of 15.

**Screen erase.** Erases the entire screen of data and resets the cursor to the beginning of the first line. The erase operation consists of inserting a blank into each character location.

**New line.** Erases all data from the current cursor location to the end of the line, and moves the cursor to the beginning of the next line.

**Horizontal tab.** Each line is divided into eight-character fields with tab stops after every eighth character. The horizontal tab command erases data from the current cursor location through the remainder of a field and moves the cursor to the beginning of the next field.

**Read data (optional).** Presents the character at the current cursor location to the output data lines and advances the cursor to the next location. If the cursor is in the last location of a line, it advances to the beginning of the next line. If it is in the last location of the last line it moves to the beginning of the first line. The character presented to the output data lines remains present until the next read or write command.

\*The *cursor location* defines the location to be accessed by the next read or write command. A *cursor mark* is not normally visible on the screen, but is optionally available as a six-dot underline.

## Optional Protection Control

This control allows the user to hold data in selected fields constant, while varying data in other fields. When the protection control is off, all character locations are unprotected and data may be entered or altered in any location. When switched on, data in assigned locations becomes protected. Note that the fields assigned to protected and variable data may be of any length.

To utilize this control the user adds an extra tag bit to each six-bit input character. All seven bits are stored in the MRD-200 memory. The effect of the tag bit is explained below.

**With the protection control off,** all locations, regardless of the state of the tag bit, are unprotected and may be altered. Those locations with the tag bit "true" can then be placed in a

protected condition by switching the protection control on.

All control commands operate normally with the protection control off. If the blink option has been specified, data with the tag bit "true" will blink on and off four times per second.

**With the protection control on,** characters that have been written into memory with the tag bit "true" are placed in a protected condition and will be displayed at half intensity. Characters written with the tag bit "false" are unprotected and are displayed at full intensity.

Control commands will not disturb protected data. The cursor will skip over all protected data, preventing it from being addressed, written over or read out. "New line" or "screen erase" commands will change only unprotected or variable data.

The "horizontal tab" command does not move the cursor between the normal fixed tab stops. Rather, it will erase only the remainder of a field of variable data, regardless of its length, and move the cursor to the first location of the next field assigned to variable data.

Number of lines	Characters per line	
	32	64
1	F	F
2	F	F
4	F	F or S
8	F or S	F or S
16	S	S

Table 1: **Memory Arrangements**

**NOTE:** This table shows which data arrangements are available with fast (F) or slow (S) memory organization.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Q	R	S	T	U	V	W	X	Y	Z	Ø	1	2	3	4	5
6	7	8	9	!	"	#	\$	%	&	'	(	)	*	+	,
-	.	/	@	:	;	<	=	>	?	[	\	]	↑	←	SP

Table 2: **MRD-200 Character Set**

Control Command	Execution Time	
	Fast	Slow
Write Data	100µsec, max	1 msec, max.
Line Select	1µsec	1µsec
Screen Erase	1 msec, avg.	1 msec, avg.
New Line	100µsec, avg.	600µsec, avg.
Read Data	5 msec, avg.	1 msec, avg.
Horizontal Tab	100µsec, max.	1 msec, max.

Table 3: **Execution Times**



## Specifications

<b>Character set</b>	64 alphanumeric characters. Each character is formed by a 5x7 dot matrix.
<b>Memory capacity</b>	32, 64, 128, 256, 512 or 1,024 characters.
<b>Data arrangement</b>	Lines per display: 1, 2, 4, 8 or 16. Characters per line: 32 or 64. Number of lines and number of characters per line must be specified.
<b>Display presentation</b>	The data appears within a display page that is centered on the screen. The user has a choice of either dark characters on a light background or light characters on a dark background within the display page.
<b>Data and control signal levels</b>	TTL compatible
<b>Cursor controls</b>	Forward, Back, Up, Down and Home. Movement of the cursor will not affect any of the data displayed.
<b>Cursor mark (optional)</b>	6-dot underline mark indicates the location to be accessed by the next read or write command.
<b>Video output</b>	Composite video signal compatible with EIA Standard, 525-line TV monitor. 1 volt p-p, unbalanced, from 75 ohms able to drive more than 1,000 ft. over RG59/U cable.
<b>Refresh rate</b>	60 frames/second.
<b>Video output connector</b>	BNC.
<b>Physical</b>	Size: 5¼"x19"x8" rack mountable in a standard 19" RETMA relay rack.  Weight: 15 lbs. (approx.)
<b>Power</b>	20 watts at 117 VAC/60 HERTZ; 6 ft. line cord provided.
<b>Environmental</b>	Operating temperature: 0 to 50°C. Operating humidity: 10 to 90% Storage temperature: -40 to 85°C.

# ADDs

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